

What is claimed is:

1. A magnetic device comprising first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between the first and second ferromagnetic films, the antiferromagnetically coupling film being formed of an alloy comprising Ru and Fe.
2. The device of claim 1 wherein each of the first and second ferromagnetic films is formed of an alloy comprising Co.
3. The device according to claim 1 wherein the alloy comprising Ru and Fe is an alloy consisting essentially of Ru and Fe and having a composition $\text{Ru}_{100-x}\text{Fe}_x$ wherein x is between approximately 10 and approximately 60 atomic percent.

4. The device of claim 1 further comprising:

a pinned ferromagnetic layer having its magnetic moment fixed in a preferred direction in the absence of a magnetic field in the range of interest;

a free ferromagnetic layer having its magnetic moment free to rotate relative to the moment of the pinned ferromagnetic layer in the presence of a magnetic field in the range of interest; and

a nonmagnetic spacer layer located between and in contact with the pinned and free ferromagnetic layers; and wherein at least one of the fixed and free ferromagnetic layers comprises the antiferromagnetically coupled first and second ferromagnetic films and the antiferromagnetically coupling film.

5. The device of claim 4 wherein the magnetic device is a spin valve magnetoresistive sensor and the nonmagnetic spacer layer is formed of a metallic electrically conducting material.

6. The device of claim 4 wherein the magnetic device is a magnetic tunnel junction device and the nonmagnetic spacer layer is formed of an electrically insulating material.

7. A magnetoresistive spin valve sensor comprising:

- a substrate;
- a fixed ferromagnetic layer formed on the substrate and having its magnetization direction pinned in a preferred direction in the absence of an applied magnetic field;
- a nonmagnetic metallic electrically conducting spacer layer in contact with the fixed ferromagnetic layer; and
- a free ferromagnetic layer in contact with the spacer layer and having its magnetization direction free to rotate relative to the magnetization direction of the fixed ferromagnetic layer; and wherein at least one of the fixed and free ferromagnetic layers comprises first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films and having a thickness sufficient to couple the first and second ferromagnetic films together with their magnetic moments oriented antiparallel to one another, the antiferromagnetically coupling film being formed of a material consisting essentially of Ru and Fe and having a composition $\text{Ru}_{100-x}\text{Fe}_x$ wherein x is between approximately 10 and approximately 60 atomic percent.

8. A magnetic tunnel junction device comprising:

a substrate;

a fixed ferromagnetic layer having its magnetization direction fixed in a preferred direction in the absence of an applied magnetic field;

an insulating tunnel barrier layer in contact with the fixed ferromagnetic layer; and

a sensing ferromagnetic layer having its magnetization direction free to rotate relative to the magnetization direction of the fixed ferromagnetic layer and in contact with the insulating tunnel barrier layer; and wherein at least one of the fixed and sensing ferromagnetic layers comprises first and second ferromagnetic films antiferromagnetically coupled to one another and an antiferromagnetically coupling film located between and in contact with the first and second ferromagnetic films and having a thickness sufficient to couple the first and second ferromagnetic films together with their magnetic moments oriented antiparallel to one another, the antiferromagnetically coupling film being formed of a material consisting essentially of Ru and Fe and having a composition $\text{Ru}_{100-x}\text{Fe}_x$ wherein x is between approximately 10 and approximately 60 atomic percent.